

**REMARKS**

Favorable reconsideration of this application is respectfully requested.

**The Final Rejection Is Premature**

It is respectfully submitted that pursuant to M.P.E.P. §706.07(a) the final rejection is premature for two reasons, and that the finality of the rejection should be withdrawn. First, the Office has included a rejection on newly-cited art (U.S. Published Application 2003/0048792 to Xu, et al.) of claims not amended by Applicants. Second, and independently of the first reason, the final rejection is premature because it includes a rejection on prior art not of record of claims which were amended to include limitations which should reasonably have been expected to be claimed.

M.P.E.P. §706.07(a) states that "a second or any subsequent action on the merits in any application or patent undergoing re-examination proceedings will not be made final if it includes a rejection, on newly-cited art, ...of any claim not amended by applicant or patent owner in spite of the fact that other claims may have been amended to require newly-cited art".

This Office Action includes rejections based upon Xu, et al. of claims that have not been amended by Applicants, including Claims 17-20, 28, 31, 35-36, 39-41 and 43, all of which are original non-amended claims. Thus, for this reason, the finality of the present rejection is improper and should be withdrawn.

M.P.E.P. §706.07(a) further states that a second or any subsequent action on the merits "should not be made final if it includes a rejection, on prior art not of record, of any claim amended to include limitations which should reasonably have been expected to be claimed".

Applicant's Amendment of November 27, 2006 amended the independent claims to recite that the steps of the claimed method are performed in a linecard of a storage switch, and to recite that the elements of the storage switch in the apparatus claims were in a linecard of the storage switch. These amendments were made notwithstanding Applicant's belief that the principal reference to Guha relied upon by the Office does not teach or suggest a storage switch that either performs the claimed functions or incorporates the claimed elements, in order to emphasize the distinction between the claims and the Guha reference and in a *bona fide* attempt to advance the prosecution of this application.

The specification discloses that the claimed Quality of Service functionality is embodied in the storage switch of the invention, and in particular that this functionality may be embodied in the intelligent linecards of the switch. The linecard is described at pages 12-19 (paragraphs [0035]-[0054]) of the specification, and shown in Figure 6. The specification describes at pages 36-43 (paragraphs [0103]-[0123]) that in a preferred embodiment the Quality of Service function is performed by the linecards. Moreover, Applicants have consistently argued in prior responses to Office Actions that the Quality of Service functionality of the storage switch of the invention is performed on a linecard of the switch.

Thus, given the extensive description in the specification of the linecard functionality and the previous arguments in response to prior Office Actions about the intelligent storage switch performing Quality of Service, the amendments made to the claims in response to the last Office Action to include the limitations that it is the linecard of the switch which performs the Quality of Service function should reasonably have been

expected to be claimed. Thus, the present rejections on the newly-cited reference to Xu should not have been made final. Accordingly, it is requested that the finality of the present rejection be withdrawn.

Without regard to whether the final rejection is premature, this Amendment should nevertheless be entered because it does not raise new issues which would require a new search. The amendments to the independent claims merely incorporate limitations from the dependent claims which have already been searched and considered in previous Office Actions. Even if the Office disagrees with Applicant's position that the claims distinguish over the cited art, this Amendment should be entered in any event since it places the claims in better condition for appeal,

### **The Rejections Under 35 U.S.C. §103**

The rejections of the various claims under 35 U.S.C. §103 based upon the newly-cited reference to Xu, et al. alone or in combination with the previously cited references are respectfully traversed. For the reasons which follow it is respectfully submitted that neither Xu or the other prior art of record, alone or in combination, teaches or suggests the invention set forth in the claims, and that the claims are allowable.

Independent Claim 1 has been amended to incorporate substantially dependent Claim 7. Independent Claims 22, 25 and 30 have been amended to incorporate limitations from dependent Claims 23, 29 and 32, respectively; and, Claim 33 has been amended to incorporate substantially Claim 34.

With these amendments, all independent Claims 1, 9, 22, 25, 30, 33 and 38, except for independent Claim 37, recite in somewhat different ways that the linecard of the storage switch estimates the bandwidth utilized by an initiator accessing a storage

device as the number of requests per second times an average size of requests from the initiator. The prior art of record does not teach or suggest estimating bandwidth utilized by an initiator by the number of requests per second times the average size of the requests, as claimed.

Independent Claim 37 sets forth a storage network that includes a switch having a linecard where the switch is designed to notify an initiator to reduce a number of concurrent requests when the number of packets in the buffer in the switch exceeds a specified threshold. None of the cited prior art teaches a storage switch that notifies an initiator to reduce the number of concurrent requests based upon the number of packets in a buffer, as claimed.

**Claims 1, 3-4, 25, 27-28, 33 and 35-36 Are Not Obvious and Unpatentable Over Xu, et al.**

The cited U.S. Application 2003/0048792 to Xu, et al. discloses a switching architecture design for a communications network switch/router that includes ingress linecards and egress linecards connected to a switching fabric. The linecards comprise buffers and schedulers for input and output traffic to the switching architecture, where the ingress and egress linecards together process traffic to provide class of service (CoS) and type of service (ToS), and the egress linecard processes and outputs packets according to priority level of CoS/ToS to afford quality of service (QoS) (see paragraphs [0039], [0043]). As shown in Figure 4, and as described at paragraph [0042], the switching architecture provides CoS/ToS by classifying incoming packets according to priority as “low priority” (LP), “high priority” (HP) and “medium priority” (MP), buffers the packets, and schedules the output of packets from the switch in accordance with a specified QoS. Thus, Xu teaches performing QoS entirely within the switch/router by

using the buffers and schedulers to control the flow of packets through the switch itself according to ToS/CoS priority. Significantly, Xu does not communicate with or control initiators or any other such external device to provide QoS, but rather operates on requests entirely within his disclosed switch/router to provide QoS. Xu also discloses nothing with regard to estimating, controlling or guaranteeing bandwidth to an initiator.

Independent Claim 1 is directed to a method for use in a storage network having a storage switch with a linecard, and recites, in relevant part:

wherein providing quality of service includes guaranteeing a minimum bandwidth to the at least one initiator to access the storage device by estimating an actual bandwidth utilized by the initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the at least one initiator (emphasis added)

Independent Claim 25 is directed to a switch for use in a storage network that has a linecard which comprises a bandwidth controller, and recites in relevant part:

a bandwidth controller, the bandwidth controller including a processor, a traffic manager, and a buffer, for controlling bandwidth through the port by controlling a number of requests per second times an average size of the requests (emphasis added)

Independent Claim 33 is directed to a storage switch having means for providing Quality of Service, and recites in relevant part:

means for estimating an actual bandwidth utilized by the at least one initiator, where the actual bandwidth is estimated by the number of requests per second times the average size of the requests from the at least one initiator (emphasis added)

As to independent Claim 1, Xu does not teach or suggest providing quality of service by guaranteeing a minimum bandwidth to an initiator to access a storage device by estimating the actual bandwidth utilized as the number of requests per second times the average size of the requests from the initiator, as set forth in Claim 1.

As to independent Claim 25, Xu does not teach or suggest a switch in a storage network having a linecard that comprises a bandwidth controller for controlling bandwidth through a port of the switch by controlling the number of requests per second times an average size of the requests, as set forth in Claim 25.

As to independent Claim 33, Xu does not teach or suggest a storage switch having means for providing Quality of Service that comprises means for guaranteeing a minimum bandwidth to an initiator to access a storage device and means for estimating an actual bandwidth utilized by the initiator, where the actual bandwidth is estimated by the number of requests per second times the average size of the requests from the initiator, as set forth in Claim 33.

There is simply no teaching or suggestion in Xu of estimating bandwidth utilized by an initiator by the number of requests per second times the average size of the requests, as set forth in independent Claims 1, 25 and 33. There is also no teaching or suggestion in Xu of guaranteeing a minimum bandwidth to the initiator as set forth in independent Claims 1 and 33, or of controlling the bandwidth through the port by controlling the number of requests as set forth in independent Claim 25. Accordingly, Xu, et al. cannot render independent Claims 1, 25 and 33, or the claims which depend therefrom, obvious, and the rejections of these claims should be withdrawn.

### **The Rejection Fails to Interpret Claim 33 Pursuant to Section 112, ¶6**

Moreover, as an additional reason for withdrawing the rejection, Claim 33 is in means plus function format, reciting the elements "means for guaranteeing a minimum bandwidth" and "means for estimating an actual bandwidth". Claims in means plus function format must be interpreted in accordance with 35 U.S.C. §112, ¶ 6, which

requires that the means plus function elements be construed to cover the structure, materials or acts disclosed in the specification for performing the recited functions, and equivalents of these.

In order to set forth a *prima facie* case of obviousness, the burden is on the Office to identify the structure disclosed in Applicant's specification which performs the cited functions, and point to corresponding or equivalent structure in the references. Since the Office has failed to do this, it has failed to establish a *prima facie* case of obviousness to support its rejection of independent Claim 33 and Claims 34-36 dependent thereon. For this reason also the rejection should be withdrawn.

**Claims 1, 3-4, 25, 27-28, 33 and 35-36 Are Not Obvious Over Guha, et al. In View of Xu, et al.**

For the reasons previously set forth in Applicants' previous response to the rejections based on Guha, it is again respectfully submitted that the Office is improperly construing the "LIC" of Figure 1 of Guha to comprise a storage switch. It is again respectfully submitted that Guha discloses a storage switch as SAN switch 42 which connects servers 39-41 with storage devices 44, as best illustrated in Figure 4, and that Guha discloses a separate and distinct Quality of Service enforcer for enforcing QoS. The separate QoS enforcer is at the input to the Layer 4 switch 38 that connects to the servers and serves as a "load balancing network device", as disclosed at paragraph [0048]. There is no disclosure of the QoS enforcer 34 cooperating in any way with the SAN storage switch 42.

Furthermore, Applicant's claims require a structure in which the storage switch has a "linecard connected to the at least one initiator and the at least one storage device for

communicating with the at least one initiator and the at least one storage device", as set forth in Claim 1, for example. In Guha, although not disclosed, linecards may exist in SAN 42 which connects servers 39-41 (initiators) to storage devices 44, and may exist in the Level 4 switch 38 which connects the servers to the network. However, such linecards have nothing to do with QoS enforcer 34, and would not perform any of the claimed QoS functions, unless the references were reconstructed based upon Applicant's specification. Guha does not disclose or suggest the claimed structure where the QoS is performed by linecards which connect initiators and storage devices, as claimed.

Even assuming, *arguendo*, that Guha and Xu could be combined as suggested by the Office, no logical combination of Guha and Xu would have QoS performed by linecards which connect initiators and storage devices, as claimed. Whether Xu "could have" implemented the storage switch as linecards, as stated by the Office on page 6 of the Office Action, is irrelevant. "Could have implemented" is not the test for obviousness. It is similar to the legally incorrect "obvious to try" test. Also, it relies on hindsight since it improperly relies upon the teachings of Applicant's own specification to reconstruct the references rather than upon the teachings of the references and what they would suggest to one skilled in the art. Thus, it is submitted that Guha and Xu cannot be combined as suggested by the Office

In addition to the impropriety of combining Guha and Xu for the reasons stated above, no combination of the references would produce the claimed invention because the references neither teach nor suggest guaranteeing a minimum bandwidth to an initiator to access a storage device by estimating an actual bandwidth utilized by the initiator, where the bandwidth is estimated by the number of requests per second times

an average size of requests from the initiator, as set forth in Claim 1. Nothing in Guha, Xu, or any of the other cited references teaches or suggests estimating bandwidth by the number of requests per second times an average size of a request, as claimed.

As to independent Claim 25, the combination of Guha and Xu would also not produce a switch for a storage network having a linecard that comprises a bandwidth controller for controlling bandwidth through the port of the switch by controlling a number of requests per second times an average size of the requests, as set forth in Claim 25.

As to Claim 33, the combination of Guha and Xu would also not produce a storage switch comprising means for guaranteeing a minimum bandwidth to an initiator to access a storage device, and means for estimating an actual bandwidth utilized by the initiator where the actual bandwidth is estimated by the number of requests times the actual size of the requests from the initiator, as set forth in Claim 33.

Accordingly, the rejections of independent Claims 1, 25 and 33, and the claims dependent thereon on the combination of Guha and Xu are improper and should be withdrawn.

**Claims 9, 15 and 30 Would Not Be Obvious Over Guha, et al. and Ellesson, et al. In View of Xu, et al.**

Independent Claim 9 is directed to a method for use in a storage switch and recites in relevant part:

estimating, by the linecard of the storage switch, an actual bandwidth utilized by the at least one initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the at least one initiator

Independent Claim 30 is directed to a switch having a linecard that includes a request controller that “estimates bandwidth by a number of requests per second times

an average size of the requests”, and a traffic manager that activates a request controller to control the bandwidth when a specified threshold in a buffer is reached.

For the same reasons pointed out above, neither Guha nor Xu teach or suggest estimating bandwidth by the number of requests per second times an average size of the requests, as set forth in independent Claims 9 and 30. U.S. Patent No. 6,459,682 to Ellesson, et al. also fails to teach or suggest these limitations, and, accordingly, cannot cure the deficiencies in the disclosures of Guha and Xu in this regard.

Ellesson, et al. relates to an IP network having ingress and egress edge devices that interface customer premise networks with a backbone network. Contrary to the Office's suggestion on page 10 of the Office Action, Ellesson neither discloses a storage switch nor guarantees a minimum bandwidth to an initiator. In Column 1, lines 49-52, referred to by the Office, Ellesson merely discusses and defines a service level agreement (SLA) as specifying a customer's expectations in terms of network parameters. At Column 5, line 48 to Column 6, line 26, also referred to by the Office, Ellesson describes performance monitoring to estimate bandwidth, delay and loss characteristics by using “probe packets” or “header fields” of encapsulated data packets, and by collecting statistics at the edge devices. Ellesson does not disclose or suggest anything about estimating bandwidth by the number of requests per second times an average size of requests, nor does Ellesson disclose guaranteeing a minimum bandwidth, as stated claimed.

Accordingly, no logical combination of these references would produce the claimed invention, and it is respectfully submitted that independent Claims 9 and 30 and

the claims dependent thereon are allowable over the combination of Guha, Ellesson and Xu.

**Claim 7:**

As to the rejection of dependent Claim 7 on the combination of Guha, Connor and Ellesson, Claim 7 has been cancelled and the recitations of Claim 7 incorporated into Claim 1. These recitations include estimating an actual bandwidth utilized by an initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the initiator.

Contrary to the Office's assertion on page 14 of the Office Action, and for the reasons set forth above, Ellesson does not teach or suggest estimating an actual bandwidth utilized by an initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the initiator, as recited by Claim 1 and the other independent claims. Ellesson's Claim 18 that recites "monitoring traffic . . . at each of a plurality of edge devices" discloses nothing about estimating an actual bandwidth as the number of requests per second times an average size of requests, as claimed. Indeed, Ellesson's Claim 18 further recites that such monitoring is "to classify said traffic".

The fact that monitoring of traffic "can be accomplished by measuring the number of requests times an average size of requests" as stated by the Office, is not the test for obviousness, and is legally improper because "can be" relies upon hindsight gained from Applicant's specification, rather than from the teachings or suggestions of the references themselves. Accordingly, for these reasons also Claim 1, and the other independent

claims, cannot be rendered obvious by Guha, Connor, Ellesson and Xu, either individually or in combination.

### **Claim 16**

Independent Claim 16 was rejected for the same reasons that Claim 9 was rejected. However, similarly to Claim 9, Claim 16 recites, in relevant part:

monitoring, by the linecard of the storage switch, an actual bandwidth utilized by each initiator, where the actual bandwidth is estimated by a number of requests per second from the initiator times an average size of the requests from the initiator;

These recitations of Claim 16 are substantially the same as in Claim 9, and Claim 16 is allowable over the references for the same reasons set forth above in connection with Claim 9.

### **Claim 38:**

As to independent Claim 38, this claim is directed to machine readable media having instructions which when executed on the linecard perform steps of guaranteeing a minimum bandwidth and estimating an actual bandwidth that are substantially the same as forth in Claims 9 and 16. Accordingly, for the same reasons pointed out above with respect to Claims 9 and 16, Claim 38 is also allowable over the references.

### **Claim 37:**

Independent Claim 37 is directed to a storage network comprising an initiator, a storage device and a switch having a linecard in communication with the initiator and storage device and which includes a traffic manager in communication with a buffer, and the claim recites that when the buffer includes a number of packets from the initiator that exceeds a specified threshold, the switch is designed to notify the initiator to reduce the number of concurrent requests.

Significantly, the storage switch of the invention does not control the number of concurrent requests by marking or dropping packets as taught by Ellesson, et al., for example. Rather, Claim 37 requires that the switch notify the initiator to reduce the number of concurrent requests when the number of packets in a buffer in the switch itself exceeds a specified threshold.

None of the prior art of record discloses or suggests a storage switch which performs the functions set forth in Claim 37 of notifying an initiator so that the initiator itself controls the number of concurrent requests it sends to the switch. Accordingly, it is respectfully submitted that Claim 37 is allowable over the cited art.

In view of the foregoing, it is respectfully submitted that independent Claims 1, 9, 16, 22, 25, 30, 32, 37 and 38 recite limitations that are neither disclosed nor suggested by any of the prior art of record, either individually or in combination, and that these claims and the claims dependent thereon are allowable over the prior art. Accordingly, it is respectfully submitted that all claims in this application are allowable, and that this application is in condition for allowance.

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance, and early allowance of all claims is solicited.

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Respectfully Submitted,

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